IGCSE Chemistry section 1i

IDENTIFYING THE PRODUCTS OF ELECTROLYSIS OF AQUEOUS SOLUTIONS

Apparatus and chemicals

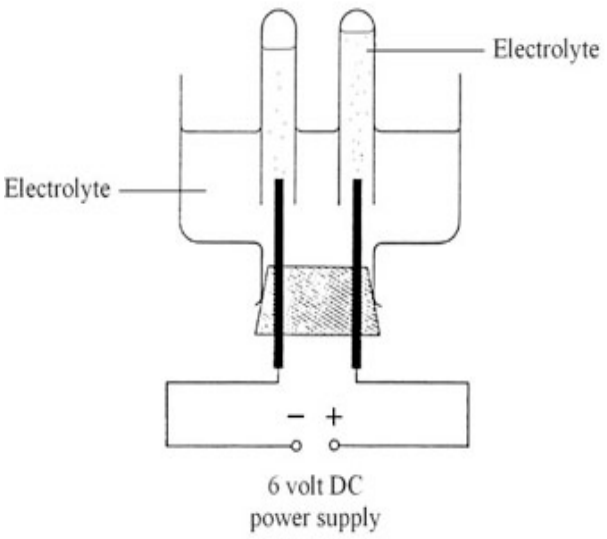
- electrolysis apparatus (see diagram)
- graphite electrodes (about 5 mm diameter), 2
- large rubber bung to fit electrolysis cell, with holes to carry the graphite electrodes
- small test-tubes (to fit over the electrodes), 2
- DC power supply (6 V)
- leads and crocodile clips
- wooden spills
- small pieces of emery paper
- strips of Universal indicator paper
- disposable plastic gloves
- clamp and stand
- small light bulb in holder (6 V, 5 W)

Procedure

HEALTH & SAFETY: Wear eye protection

a Set up a table for results e.g.

Lamp lights?					
Observations at	cathode (-)				
	anode (+)				
Test used for product at	cathode (-)				
	anode (+)				
Identity of product at	cathode (-)				
	anode (+)				



b Clamp the electrolysis cell and pour in enough of the first electrolyte so that the tops of the electrodes are covered with about 1–2 cm of liquid. Fill the two test-tubes with the same electrolyte. Wearing gloves, close the end of each test-tube in turn with a finger and invert it over an electrode, so that no air is allowed to enter (see diagram). During electrolysis it may be necessary to lift the test-tubes slightly to ensure that the electrodes are not completely enclosed, preventing the flow of current.

c Connect the circuit, and mark the polarity of each electrode on the bung. The circuit should be checked *before* being switched on.

d Switch on the circuit, then:

- observe whether or not the lamp lights up;
- look for the substances produced at each electrode – ie gaseous, solid or in solution;
- write down results *after each observation*, not when all the experiments are finished.

e Only carry out the electrolysis for long enough to make the necessary observations. Prolonging the electrolyses unnecessarily causes toxic gases such as chlorine and bromine to be produced in unacceptably hazardous quantities.

f After each electrolysis switch off the current and remove the test-tubes from the cell to test any gases present by lifting them slowly in turn to let any remaining solution drain out before closing the end with a finger. Carry out the tests on the gases as instructed.

g Wash the cell with plenty of water and dry the outside with a paper towel before fixing it back into position and re-connecting the power supply. It is important to connect the leads according to the polarities marked on the bung.

i Repeat the experiment with each of the other four solutions, trying to keep to the order given in the table. Zinc chloride and copper nitrate should be the last electrolytes tested. This is because they deposit solids on the cathode. If zinc chloride is electrolysed first, the solid deposit on the cathode can be easily removed with a piece of emery paper or dipping the end of the electrode in some dilute hydrochloric acid in a beaker.